Scientific Notation and Significant Figures **Name:** KEY

Chapter 1 **Date:** _____ **Period:** __

Practice Problems

I. Scientific Notation & Significant Digits

A. Express each of the following numbers in scientific notation and the correct number of significant digits

1.	2370 m	2.37×10^3 m	3
2.	0.3 g	3×10^{-1} g	1
3.	140.02 m/s	1.4002×10^{2} m/s	5
4.	0.000 045 amp	4.5×10^{-5} A	2
5.	0.000 00707 mL	7.07×10^{-6} mL	3

B. Express each of the following in ordinary notation

1.	5.63×10^{-3} m^2	.00563 m^2	3
2.	6.7×10^{5} cm	670000 cm	2
3.	1.01×10^{3} mg	1010 mg	3
4.	2.002×10^{-4} kg	.0002002 kg	4

C. Perform the indicated operations. Place all answers in proper scientific notation. Include units where appropriate.

1. $(2.60 \times 10^{-3}\ m)(1.2 \times 10^{4}\ m)$ 3.12×10^{1} m = 3.1×10^{1} m

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2 sig figs

2. $(8.7 \times 10^{5}\ cm)(2.4 \times 10^{-3} cm)$ $20.88 \times 10^{2}\ cm = 2.088 \times 10^{3}\ cm = \boxed{2.1 \times 10^{3}\ cm}$

3. $1.01 \times 10^{3}\ mg$

$9.04 \times 10^{2} mL$ $.11173 \times 10^{1}\ mg/mL = \boxed{1.12 \times 10^{0}\ mg/mL}$

4. $2.002 \times 10^{-4}\ kg$

$3.00 \times 10^{-8}\ m/s^{2}$ $.66733 \times 10^{4} = 6.6733 \times 10^{3}\ kg\ m/s^{2} = \boxed{6.67 \times 10^{3}\ kg\ m/s^{2}}$

5. $2.00 \times 10^{-3}\ cm + 3.02 \times 10^{-2}\ cm$ $\boxed{3.22 \times 10^{-2}\ cm}$

6. $3.56 \times 10^{2}\ s - 4.5 \times 10^{-3}\ s$ $\boxed{3.6 \times 10^{2}\ s}$

7. $1.0009 \times 10^{4}\ m/s - 3.3 \times 10^{3}\ m/s$ $\boxed{6.7 \times 10^{3}\ m/s}$

8. $2.2 \times 10^{3}\ N - 1.02 \times 10^{3}\ N$ $1.18 \times 10^{3}\ N = \boxed{1.2 \times 10^{3}\ N}$

II. Dimensional Analysis: Solve the following problems using dimensional analysis only. Include units and show all work.

1. How many kiloseconds in 495 seconds?

$$495\ sec \times \frac{1\ kilosec}{1000\ sec} = \boxed{.495\ kiloseconds}$$

2. How many meters in 0.007 mm?

$$.007\ mm \times \frac{1\ cm}{10\ mm} \times \frac{1\ m}{100\ cm} = \boxed{7 \times 10^{-6}\ m}$$

3. Convert 70 mph to km/h.

$$\frac{70\ mi}{hr} \times \frac{1610\ m}{1\ mi} \times \frac{1\ km}{1000\ m} = \boxed{112.7\ km/hr}$$

4. Convert 3.00×10^8 m/s (the speed of light) to mph.

$$\frac{3\times10^8\ m}{sec} \times \frac{1\ mi}{1610\ m} \times \frac{3600\ sec}{1\ hr} = 670807453.4\ mph = \boxed{6.708\times10^8\ mph}$$

5. Convert $2.03\ m/s^2$ to miles per hour/second.

$$\frac{2.03\ m}{s}\cdot\frac{1}{s} \times \frac{1\ mi}{1610\ m} \times \frac{3600\ s}{1\ hr} = \boxed{4.539\ mi/h\cdot s}$$

III. Algebraic Conversions: Solve for the algebraic quantity in bold.

1. $F = m\mathbf{a}$, $\boxed{\mathbf{a} = \frac{F}{m}}$

2. $°F = 1.8°\mathbf{C} + 32$, °C =

$$\boxed{\frac{°F-32}{1.8°} = °C}$$

3. $V = lw\mathbf{h}$, $\mathbf{h}$ =

$$\boxed{h = \frac{V}{lw}}$$

4. $v_f = v_i + \mathbf{a}t$, $\mathbf{a}$ =

$$\boxed{a = \frac{v_f - v_i}{t}}$$

5. $v_f^2 = v_i^2 + 2a\mathbf{d}$, $\mathbf{d}$ =

$$\boxed{\frac{v_f^2 - v_i^2}{2a} = d}$$

6. $d = v_i t + 1/2\mathbf{g}t^2$ $\mathbf{g}$ =

$$2d - 2v_i t = gt^2$$

$$\boxed{g = \frac{2d-2v_i t}{t^2}}$$

IV. Graphing On a separate sheet of graph paper (or in excel), plot the data in the following table.

Make sure to label the axes.

Motorized Cart moving along a table.

Time (seconds)	Position (cm)
0.5	25.0
1.0	49.0
1.5	75.5
2.0	101.0
2.5	125.0
3.0	151.5
3.5	175.5

1. Which variable, time or position, is the independent variable in this graph? Explain.

TIME → AS TIME GOES ON, NEW POSITIONS ARE MEASURED.

THE POSITION IS DEPENDENT ON THE TIME.

2. What is the relationship between the variables? Explain.

LINEAR → AS TIME INCREASES, SO DOES THE POSITION.

3. Calculate the slope of the line. 48 cm/s

$m = \frac{49.0 - 25.0}{1.0 - 0.5} = 48\ cm/s$ ← COULD VARY DEPENDING ON THE POINTS YOU CHOOSE.

4. What are the units of the slope of the line? cm/s

5. Write the equation of the line. $x = 48t$ ← ALSO COULD VARY. USE THE SLOPE YOU OBTAINED IN PART 3.

$y = mx + b$

POSITION = 48(TIME) + 0